

was included in the general investigation, made by the writer of the present review,<sup>1</sup> by which the phenomenon of thermal transpiration was discovered, and although it still appears that these are the only experiments on this subject, yet they conclusively prove that the difference of the pressure on the two sides of the plate is proportional to the square roots of the absolute temperatures. So far then it would seem that the crucial experiment has been made and that the verdict is against the vortex atom theory; but this is not so, for, although the experiment Mr. Thomson suggests has been made, it is definitely and experimentally shown in the same investigation that the action of the porous plug is entirely different from that which Maxwell calls thermal effusion, being due entirely to the tangential action of the walls of the passages, and further this tangential action is in strict accordance with the present dynamical theory of gases. This experiment with the porous plug, then, affords no test whatever in the way suggested by Mr. Thomson. Mr. Thomson has, we think, been unfortunate in his choice of tests; and we would suggest the *velocity of sound* as affording a crucial test for which the experimental work is already done. It appears to be an almost obvious deduction from the vortex atom theory that the velocity of sound must be limited by the mean velocity of the vortex atoms; and since Mr. Thomson has shown that this mean velocity diminishes with the temperature, while experimentally it is found that the velocity of sound increases as the square root of the temperature, it appears that the verdict must be against the vortex atom theory. However the vortex atoms are very slippery things, and we should like to hear Mr. Thomson's opinion before adopting one of our own.

Besides discussing the theory of gases, Mr. Thomson goes somewhat fully into a vortex atom theory of chemical combinations; in this he raises many points which will doubtless be of great interest should the hypothesis survive the crucial test by the theory of gases which this essay now for the first time renders possible.

Of the mathematical interest of the essay we can only say that to those who can appreciate it this will be found to be very great.

OSBORNE REYNOLDS

#### OUR BOOK SHELF

*Krystallographische Untersuchungen an homologen und isomeren Reihen.* Von Dr. A. Brezina. I. Theil. Methoden. (Wien, 1884.)

THIS very useful volume forms an introduction to the author's crystallographic investigations which earned the prize of the Vienna Academy. It deals exclusively with the principles and the methods employed in those investigations, and constitutes a complete storehouse of the formulæ required in the study of crystals, and of the best means of applying those formulæ. The following subjects are successively treated: the optical principles involved in the goniometer; the practical use of the instrument, and the errors to which it is liable; the criticism of probable errors of observation; stereographic projection; all possible cases of trigonometrical calculation, including the method of least squares; and a slight sketch of the use of the polarising apparatus.

An important feature of the book is the illustration of methods by the actual measurement of seven crystals of a triclinic substance. The readings of the goniometer scale are first given, and from these the reader is led

<sup>1</sup> "Certain Dimensional Properties of Matter in the Gaseous State," *Phil. Trans.* 1879, Part II.

through the entire series of processes: stereographic projection, assignment of indices, calculation of elements, and recalculation of angles, each given in its place as an example of the principles and formulæ employed. This practical illustration is a far more effectual means of recommending the methods to the reader than mere verbal description.

It will probably be found that these methods of calculation are the most valuable part of the book; they are so systematically arranged and tabulated that the various steps may be distinguished at a glance, and any numerical error must be detected at once, while much labour is saved by the methodical order in which the operations are conducted.

It is to be presumed that the laborious process of calculating the angle between each pair of faces from the elements by means of the general formula is given as an exercise in the method of least squares rather than as an example of the course to be actually adopted in any but rare cases.

One subject, however, of some importance is barely touched upon; namely, the criticism of images obtained from crystal faces on the goniometer, and their interpretation. Both in the descriptive paragraphs and in the above-mentioned illustration, all measurements of the same angle upon different crystals are assumed to be equally good, so that their arithmetic mean is adopted as the observed value, whereas the difficulties presented by multiple images seem to deserve treatment in a book which deals so exhaustively with the practical side of the subject. It is to be regretted also that the discussion of optical properties and measurement has been almost crowded out of the work.

H. A. M.

#### LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

#### The Remarkable Sunsets

SPEAKING of Virginia City, the great silver mining centre of Nevada State, I said, in "An Engineer's Holiday," that it "lies among the foothills of the Sierra, at an elevation of 6200 feet, on the eastern face of Mount Davidson . . . surrounded by innumerable interlocked mountains, conical in outline, red-brown in colour, and perfectly bare of all vegetation. These stretch, as far as the eye can reach, to where the snowy tops of the Humboldt peaks stand against the sky, and the terrible sterility of the scene is enhanced rather than relieved by the thin meanderings of the Carson River, whose course is marked by a narrow green line. This is the only sign of water visible in the arid panorama, whose bare, red cones are steeped all day in dust-haze, and lighted for a few minutes at sunset by an 'Alpenglow' which dyes the countless peaks in as countless gradations of rosy light."

It certainly did not occur to me, when I wrote the above three years ago, that the finer and higher particles of the dust-haze which obscures the dry air of the American desert may have been concerned in producing the splendid sunset effects which I witnessed at Virginia City; but this, after our recent experiences, seems very probable.

D. PIDGEON

Holmwood, Putney Hill, December 22

I HAVE received a letter, dated December 5, from Mr. Joseph Moore, of New Garden, North Carolina, U.S.A., in which he informs me that "the phenomena at both sunset and sunrise have been unusual in more than a dozen instances here during the autumn. Only the night before last we had an extraordinary sunset. The sky bore all the tints of which you speak, but I do

not remember to have noticed the cirrus cloud in more than one instance. The sunsets have been subject for remark in quite a number of the papers." I inclose also a newspaper, the *Olive Branch*, of Hancock, Minnesota, U.S.A., which has been forwarded to me by another correspondent, containing a notice of the sunset of November 10.

Richmond, Surrey, December 22 F. A. R. RUSSELL

IN a letter dated Tokio, October 3, describing a tour in the interior of Japan, Prof. James Main Dixon writes:—"During the two or three days at the end of August we enjoyed fine dry weather, but the sun was copper-coloured and had no brightness. It was capital weather for travelling, but rather inexplicable. When we got to Nikko, the people came to us to inquire if some catastrophe were impending, for the appearance of the sun foreboded evil. We laughed at their fears, and assured them all was right. However it seems that if the appearance of the sun foreboded no evil, it was a wonderful sign of the greatest earthquake and volcanic catastrophe on record. The fearful explosion of Krakatoa, in the Straits of Sunda, took place on August 26, and there seems little reason to doubt that the monsoon had carried the volcanic dust along with it, the dust obscuring the sun. The distance is nearly 3000 miles."

LEWIS CAMPBELL

St. Andrews, December 22

### Peripatus

DR. VON KENNEL, in a note on the "Development of Peripatus," which appeared in a recent number of the *Zoologischer Anzeiger*, and has been translated and printed in your columns, has thrown some doubt on the accuracy of the observations recorded in the late Prof. Balfour's memoir on the "Anatomy and Development of *Peripatus capensis* (*Quart. Journ. Micro. Sci.*, April, 1883). We trust that you will give us, as the editors of that memoir, this opportunity of making a few brief statements in reply to the somewhat unusually outspoken criticisms contained in his preliminary note.

Dr. von Kennel entirely omits to mention in his paper that Prof. Balfour's researches refer to a Cape species of *Peripatus* (*P. capensis*), whilst the species which he has worked at are West Indian, and differ considerably from *Peripatus capensis*.

Considering the fact, well known to embryologists, that there are numerous instances of great discrepancies in the embryonic history of closely-allied forms, it seems to us strange that the only explanation, suggested by Dr. von Kennel, of the differences between his results and those recorded in Prof. Balfour's memoir should be that the latter are absurdly erroneous.

The remarkable attitude which Dr. von Kennel has assumed in this matter must have been obvious to all competent zoologists. We offer these remarks mainly because his statements have appeared in a journal which has a wide circulation amongst readers who are not so well able to judge of the merits of the case.

We are able to state in conclusion that the results enumerated on pp. 256, 257 of Prof. Balfour's memoir have been confirmed by Mr. Sedgwick on a large number of fresh and well-preserved embryos of *Peripatus* from the Cape, obtained since the publication of the memoir.

H. N. MOSELEY  
A. SEDGWICK

[THE translator of Dr. von Kennel's "Note on the Development of *Peripatus*," to whom we submitted the above letter, writes to us that, "though with a large experience in such matters, he is quite unable to see anything 'unusually outspoken' in Dr. von Kennel's criticisms; had any such occurred, he would have passed them over; nor does he find any foundation for the statement that Dr. von Kennel explains the results of Prof. Balfour's memoir as 'absurdly erroneous.' Dr. von Kennel, at the beginning of his note, only asserts that his observations cast some doubt on those of Balfour, apologetically adding that his material was immensely richer than Balfour's, and at the conclusion of his Note he simply calls attention to the discrepancies between his observations and Balfour's illustrations." At the translator's request we quote the original of the two critical paragraphs with the translations, so that the many competent zoologists who are amongst our readers can judge whether the latter adds to or takes from the spirit of the former.—ED. NATURE.

"Ich thue dieses hauptsächlich deswegen, weil die durch Moseley und Sedgwick publicirte Abhandlung aus dem Nachlass Balfour's einige Abbildungen von Embryonen und Schnitten durch solche enthält, deren Genauigkeit ich nach meinem reichlichen und ausgezeichnet conservirten Material und nach den Beobachtungen am frischen Objecte etwas anzweifeln muss, deren Deutung vollends die Probe nicht hält."

"do this chiefly because the treatise published by Moseley and Sedgwick from the posthumous notes of Balfour contains some representations of embryos and cross-sections of the same, upon whose accuracy in details I, with my rich and well-preserved collection of specimens, and observations on fresh objects, must cast some doubt, and the interpretation of which does not bear investigation."

"Ich enthalte mich hier, um nicht weitläufig zu werden, jeder Discussion, muss jedoch noch einmal darauf hinweisen, wie wenig Balfour's Abbildungen und die Schilderungen der Herausgeber mit den hier mitgetheilten Thatsachen stimmen."

"I here abstain for the sake of brevity from all discussion, but must, however, call attention to the fact how little Balfour's illustrations and the descriptions of the Editors agree with the facts as they are here given."

### A New Rock

DURING my visit last summer to Lake Sagvand, in the Balsfjord, near the city of Tromso, I discovered a new enstatite-bearing rock, which forms entire little hills. It is composed of light yellow-green enstatite, mixed with magnesite. The magnesite, which is entirely free from lime, is partly white, partly dirty grey in colour, in which latter state it contains a little oxidulated iron, and appears then distinctly crystalline, with rhomboidal planes of cleavage. The rock is greatly interspersed with little grains of chromite, which are found in the enstatite as well as the magnesite. Here and there small grains of pyrite also appear. The substance is perfectly free from olivine, at all events neither olivine nor serpentine has been discovered under microscopical analysis.

The rock must be considered a new petrographical species. I have named it "Sagvandite," from the place where it was first discovered. It appears with a strong reddish-brown colour on its uneven surface, where the magnesite is completely washed out, so that the enstatite alone remains. The rock is not slaty, and must so far be said to be of massive structure.

When I have had an opportunity of thoroughly analysing the new substance, I propose to give a complete description of it in NATURE.

KARL PETERSEN

Tromso Museum, Finmarken, Norway, December

### Diffusion of Scientific Memoirs

IN his notice of the Reprint of Prof. Stokes' papers in NATURE for Dec. 13 (p. 145), Prof. Tait, with characteristic incisiveness, speaks of the "almost inaccessible" volumes of the *Cambridge Philosophical Transactions*, and proceeds to offer an "easy cure" for that simple though grave malady. I think if Prof. Tait had taken the trouble to make the inquiry he would have found that very few societies are so liberal in the free dissemination of their publications, and that the number of universities, prominent societies, or libraries which do not receive them gratis, or merely in exchange, is very small.

December 14

W. M. HICKS

THE question so pointedly at issue between Mr. Hicks and myself is one which can be settled by statistics only. NATURE would do a real service to science by collecting statistics as to the numbers of different centres (home, and foreign, separately) at which the *Transactions* of various scientific Societies were freely accessible in 1883 (say); and also the corresponding numbers in 1853. The Royal Society regularly publishes such information in its *Transactions*, so does the Royal Society of Edinburgh.

I have been a Fellow of the Cambridge Philosophical Society for about 30 years; and, during that time, I have received from the Society some fasciculi (of *Proceedings* only) certainly not amounting to a dozen in all:—and I am not aware that my case is an exceptional one.

Mr. Hicks writes as if he thought I was bringing an accusation. Surely the figure, of *malady*, which I was careful to employ, cannot be so construed.

P. G. TAIT